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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/734,749	12/11/2003	Haoren Zhuang	14580-045001 / FP2078	9525
20985	7590	02/08/2006	EXAMINER	
FISH & RICHARDSON, PC P.O. BOX 1022 MINNEAPOLIS, MN 55440-1022			CHACKO DAVIS, DABORAH	
			ART UNIT	PAPER NUMBER
			1756	
DATE MAILED: 02/08/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/734,749	<b>Applicant(s)</b> ZHUANG, HAOREN	
	<b>Examiner</b> Daborah Chacko-Davis	<b>Art Unit</b> 1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 November 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 12-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 12-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>12/05</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-7, 12-17, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent Application Publication No. 2003/0119273 (Aggarwal et al) in view of U. S. Patent Application Publication No. 2004/0164293 (Maloney et al).

Aggarwal, in [0065], [0066], [0067], [0068], [0069], [0070], [0090], [0094], discloses applying a hard mask layer on the capacitor device, applying a photoresist pattern (photolithography performed) to the hard mask to form a patterned layer, and performing a heat treatment in an O<sub>2</sub>/N<sub>2</sub> atmosphere to convert the hard mask material to corresponding oxides (TiO<sub>2</sub>, TiAlO) and nitrides (TiAlN, TiN). Aggarwal, in [0076], discloses an etch process that etches through the photoresist pattern to form the hard mask pattern, wherein the hard mask pattern is used for subsequent etch processes (claims 1, 2, 7, 12-13). Aggarwal, in [0051], discloses a sol-gel process for depositing the hard mask material (claim 14). Aggarwal, in [0014], discloses that the device is a FeRAM device (claims 15-17).

The difference between the claims and Aggarwal is that Aggarwal does not disclose that the hard mask layer is a photosensitive sol-gel layer. Aggarwal does not

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disclose that the sol gel layer is a titanium organic gel layer (claim 3). Aggarwal does not disclose that the sol gel layer is a titanium-aluminum organic gel layer (claim 4). Aggarwal does not disclose that the sol-gel layer is a mixture of titanium alkoxides with ethyl acetoactate (claim 5). Aggarwal does not disclose that the sol-gel layer is a mixture of one or more  $(\text{TiOEt})_4$  or  $\text{Ti}(\text{OEt})_4$  (claim 6).

Maloney, in [0144], [0145], [0146], [0147], discloses that the hard mask layer is a photosensitive sol-gel layer comprising a metal complex precursor of the claimed composition.

Therefore, it would be obvious to a skilled artisan to modify Aggarwal by employing the photosensitive sol-gel composition suggested by Maloney because Maloney, in [0173], discloses that employing the photosensitive (metal precursor) sol-gel layer as the hard mask layer enables low temperature processing and a four-fold reduction in carbon residues.

### ***Response to Arguments***

3. Applicant's arguments filed November 29, 2005, have been fully considered but they are not persuasive. The 103 rejection made in the previous office action (paper no. 0624) is maintained.

A) Applicants argue that Aggarwal et al., does not disclose a photosensitive sol-gel layer hard mask.

Aggarwal et al., is not depended upon to disclose a photosensitive sol-gel layer used as a hard mask, Maloney et al., depended upon to disclose the use of a photosensitive sol-gel layer that is converted to a hard mask layer.

B) Applicants argue that Aggarwal et al., does not disclose that the claimed sol-gel layer is converted to a hardmask by thermal decomposition treatment.

Aggarwal teaches the use of a hard mask layer that is patterned and then heat-treated in a nitrogen atmosphere to form a corresponding nitride in order to perform as a hard mask pattern.

C) Applicants argue that Maloney et al., does not disclose applying a thermal decomposition treatment to convert the sol-gel layer to a metal nitride.

Maloney et al., is not depended upon to disclose the conversion of the sol-gel layer to a nitride. However, Maloney teaches the use of sol-gel precursors that can be converted to hard mask material. Aggarwal is depended upon to disclose the formation of the metal nitride by nitridation of the patterned hard mask material.

### ***Conclusion***

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dcd

  
February 2, 2006.

  
**JOHN A. MCPHERSON**  
**PRIMARY EXAMINER**